wavelengths can include at least one wavelength at about 0.76, 0.97, 1.19, 1.45, 1.94, 2.55, 2.7, 5.5, [and] or 10.7 micrometers, which are significantly absorbed by water and are generally not significantly absorbed in materials used in structures (for graphs of absorption spectra, see pg. 1957, FT-NIR Atlas, M. Buback and H.P. Vogele, ISBN 3-527-28567-9, VCH Publishers, New York, NY; available on the internet at www.asdi.com). To determine a wavelength that is not significantly absorbed by the material composing the structure, the material composing the structure can be tested with a spectrometer, for example, to determine the absorption spectra of the material at wavelength ranges under consideration for use as the exposure wavelength. By analyzing the material's absorption spectra, an exposure wavelength that is not significantly absorbed by the material can be readily determined. Optionally, the exposure wavelength can be a wavelength that excites emission at an emission wavelength of water.

______In step S3, a reference wavelength is determined as a wavelength that is not significantly absorbed by water and is also not significantly absorbed by the material composing the structure. Determination that the reference wavelength is not significantly absorbed by the structure can be performed by using a spectrometer in a manner similar to that used to determine the exposure wavelength. Alternatively, if the detection wavelength is an emission wavelength, the reference wavelength should be one at which no significant emission from water occurs, and which also is not significantly absorbed by the material composing the structure. For example, the reference wavelength can include at least one wavelength at about 1.06 [and] or 1.66 micrometers, which wavelengths are not significantly absorbed by water.

______In step S4, a detection wavelength(s) is determined to be one that is sensitive to the exposure wavelength(s) in the presence of water, and that is not significantly absorbed by the material composing the structure. The detection wavelength can be the same wavelength as the

exposure wavelength if absorption is to be used to determine the presence of a water-suspect area, or can be an emission wavelength of water that is excited by the exposure wavelength. Such emission wavelength could include wavelengths of about 3.2 or 6.2 micrometers, for example, in which case the exposure wavelength should be at least one wavelength that is significantly absorbed by water and that is a shorter wavelength than about 3.2 or 6.2 micrometers to ensure that sufficient excitation energy is provided to any water molecules present to excite emission at such wavelengths.

______In step S5, the generator 12 is positioned to expose a predetermined area of the structure 16 with the radiation 18 at the exposure and reference wavelengths. Such step can be performed by a human user of the method using the stand 20 that supports the generator 12 and/or a view finder or visible radiation 18 generated by the generator 12, which reveals the area of the structure exposed by the radiation 18. The area of the structure 16 to be exposed by the radiation 18 can be marked with removable chalk or ink, for example, for use in positioning the senor unit 14.

______In step S6, the sensor unit 14 is positioned to receive and sense electromagnetic radiation 22 from the predetermined area of the structure 16 to be exposed with the radiation 18. Step S6 can be performed by a human user of the method using the stand 35, optionally with a view finder to align the sensor unit 14 to receive the electromagnetic radiation 18 from the area of the structure exposed by the generator 12. Positioning of the sensor unit 14 can be facilitated if the generator 12 generates radiation 18 to include visible wavelengths, or the area to be exposed by the radiation 18 can be delineated with a marker to permit the user to position the sensor unit 14 to receive radiation 22 from the structure area exposed by radiation 18.

______In step S7, the generator 12 generates the electromagnetic radiation 18, including the

determined exposure and reference wavelengths. In step S8, the generator 12 exposes the predetermined area of the structure 16 to be analyzed for the presence of a water-suspect area, with the radiation 18, which includes the exposure and reference wavelengths. In step S9, the sensor unit 14 receives the radiation 22 from the exposed predetermined area of the structure 16. The received radiation 22 is based upon (or in other words derived from) the radiation 18 used to expose the structure 16.

______In step S10, the sensor unit 14 senses an intensity level of the radiation 22 at the detection wavelength determined in step S4. The sensor unit 14 also senses an intensity level of the reference wavelength determined in step S4 from the radiation 22. In step S11 of Fig. 5[13]B, the intensity levels of the exposure and reference wavelengths are compared.

______In step S12, a determination is performed to establish whether the intensity levels of the detection and reference wavelengths differ by a predetermined amount. Preferably, the predetermined amount is at least ten percent (10%) of the reference wavelength's intensity, although this need not necessarily be so as long as the sensor(s) 26 are sufficiently sensitive to distinguish the detection and reference wavelengths' intensity levels if water is present in the exposed area of the structure. If the detection and reference wavelengths differ by the predetermined amount as determined by the performance of step S12, the method proceeds to step 13 in which a water-suspect area is determined to exist in the structure.

______In step S14 of Fig. 5B, testing is performed to determine whether the water-suspect area includes water, or is doe to some other cause such as missing insulation or the presence of different structural materials[, for example]. The presence of water in the water-suspect area in step S14 can be performed by the method of Figs. 6A and 6B which will be described in detail later in this document. Alternatively, the testing to confirm the presence of water in the water-

suspect area can also be performed with a moisture detector such as the model KJE-100 from Zeltex, Inc., of Hagerstown, Maryland. The testing to confirm the presence of water in step S14 can also be performed in numerous other ways, such as those set forth in U.S. Patent No. 5,886,636 issued March 23, 1999 to Patrick J. Toomey, the subject inventor. For example, the water-suspect area can be confirmed as containing water by scanning the water-suspect area with a capacitance meter, and determining whether the water-suspect area includes water, based on the reading of the capacitance meter. Alternatively, the water-suspect area can be confirmed as containing water by positioning an endoscopic probe in the structure in proximity to the water-suspect area, viewing the water-suspect area with the endoscopic probe, and determining whether the water-suspect area includes water, based on the viewing of the water-suspect area. As another alternative, the water-suspect area can be confirmed as including water using spaced conductive pins electrically coupled to a [resistively] resistivity meter. The pins are inserted or driven into the water-suspect area of the structure, and a signal is applied to one of the pins. The [resistively] resistivity meter senses the signal level on at least one other pin, and a determination is made to establish whether the water-suspect area of the structure is due to the presence of water, based on the signal level sensed by the [resistively] resistivity meter. Because the presence of water generally enhances electrical conductivity in the structure's materials, the less resistance observed between the pins, the more likely water is present, and vice versa.

______In step S15 of Fig. 5[13]B, a determination is made to establish whether the water-suspect area in fact includes water, based on the testing performed in step S14. If the determination in step S15 is affirmative, the source of the water is determined in step S16.

______Step S16 can be performed in numerous ways, including those disclosed in U.S. Patent No. 5,886,636. More specifically, the source of the water can be determined by detecting the pH